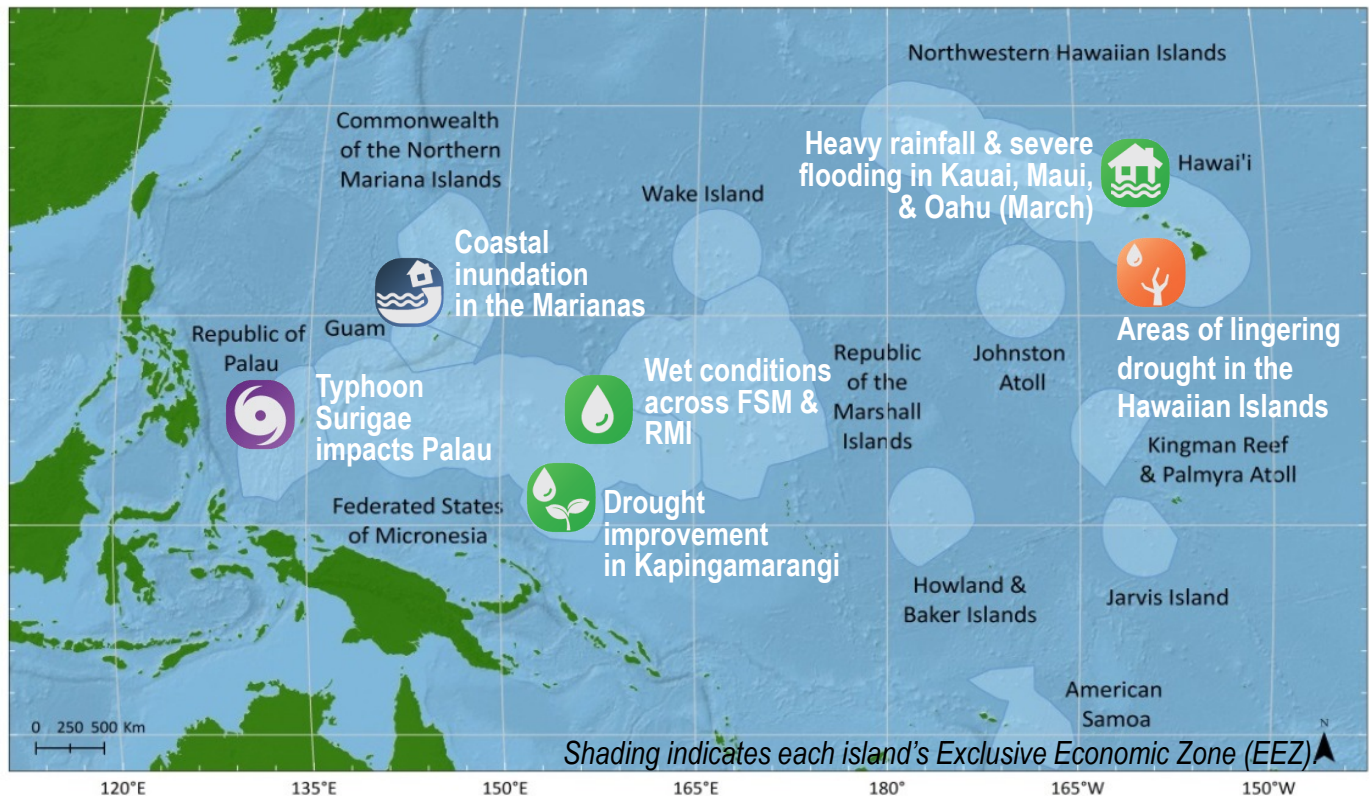


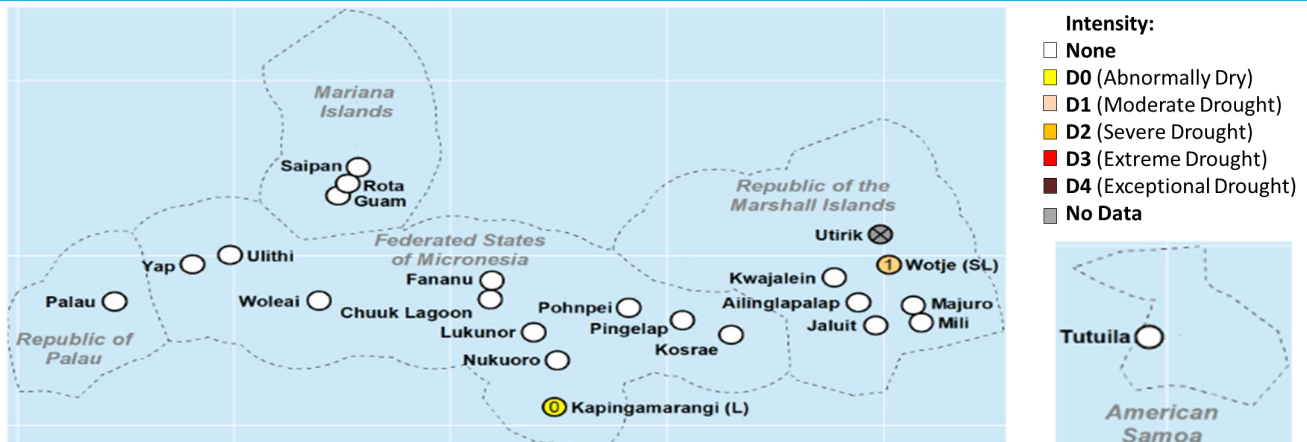
Significant Events – For March 2021–May 2021



Highlights for Hawaii and the U.S. Affiliated Pacific Islands

- In April, the tropical Pacific transitioned from La Niña conditions to ENSO-neutral conditions with a 78% chance of ENSO-neutral conditions likely to continue through the Northern Hemisphere summer (June – August 2021).
- Areas of the Federated States of Micronesia (FSM) and the Republic of the Marshall Islands (RMI) experiencing persistent drought (Kapingamarangi, Wotje) saw improvement in conditions.
- For the March – May (MAM) period, above-normal rainfall was observed across much of the western tropical Pacific in the Northern Hemisphere. This includes Airai, Palau, which observed its wettest MAM period on record, and Chuuk (FSM) its second wettest.
- In March, a multi-day storm event brought torrential rains, severe flash flooding, significant damage to property and infrastructure, and evacuations on Kaua'i, Maui, and O'ahu.
- In mid-April, Typhoon Surigae passed just north of the Republic of Palau as a Category-1 storm, causing widespread damage to property, infrastructure, communications, and utilities.
- Satellite analysis showed above-normal sea levels in the tropical western Pacific while near- or below-normal sea levels were observed in the tropical central Pacific, away from the equator.

Climate Overview – For March 2021–May 2021



June 1, 2021 USAPI Drought Monitor

Source: <https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?usapi>

Across the central and eastern equatorial Pacific Ocean, sea-surface temperatures (SSTs) were slightly below normal with ENSO-neutral conditions present. All four Niño regions registered negative SST anomalies by the end of May: Niño 3.4 region at -0.3°C ; Niño 3 at -0.3°C ; Niño 1+2 at -0.5°C ; and Niño 4 at -0.1°C .

During MAM, above-normal sea levels were observed across much of the equatorial western Pacific and in areas of the tropical central Pacific. Satellite analysis in the tropical eastern Pacific revealed below-normal sea levels during March and April. In the Hawaiian Islands, a prolonged period of above-normal sea levels (monthly means) ended by March 2021. However, daily extreme high (highest hourly water level on record for a given day) sea-level records were broken at Hilo (3/26), Honolulu (3/25), Kahului (3/12-13,27), Mokuoloe (3/11, 13, 24), and Nawiliwili (3/10). In the western Pacific, monthly extreme high (highest hourly water level on record for a given month) sea-level records were broken in Palau (March, April), Guam (April), and Saipan (March).

Extreme (D3) drought conditions were observed in Kapingamarangi (FSM) and Wotje (RMI) during March and April, with improvement in drought conditions in May. In the Marianas, Moderate Drought (D1) was observed in Guam, Rota, and Saipan during March and April. Subsequent above-normal rainfall led to drought-free conditions across the Marianas by mid-May. Median precipitation for the MAM period was above normal across much of the tropical western Pacific. Guam observed 12.86 in. (120% of normal) for MAM while Saipan logged 5.73 in. (95% of normal). Palau also experienced above-normal rainfall during the MAM period with Airai recording 50.93 in. (169% of normal). In the FSM, Yap observed above-normal MAM precipitation of 35 in. (181% of normal). Elsewhere in the FSM, Chuuk observed 52.94 in. (154% of normal), Pohnpei 73.06 in. (133% of normal), Kapingamarangi 44.88 in. (127% of normal), Kosrae 77.2 in. (142% of normal), and Lukunor 50.88 in. (144% of normal). In the RMI, Majuro observed 56.52 in. (220% of normal) for MAM while Kwajalein logged 23.83 in. (138% of normal). In the Hawaiian Islands, Hilo observed 38.96 in. (134% of normal) while Honolulu logged 4.68 in. (118% of normal), Kahului 10.52 in. (225% of normal), Lihue 13.92 in. (142% of normal), and Molokai 6.68 in. (117% of normal). Despite above-normal precipitation for the MAM period, rainfall across the Hawaiian Islands was below normal during April and May. Below-normal MAM precipitation was observed in Pago Pago, American Samoa with 24.53 in. (74% of normal).

With the South Pacific region (east of 135°E) Tropical Cyclone (TC) season ending, there were a total of eight named storms since December and an Accumulated Cyclone Energy (ACE) Index of 55.9 by the end of May 2021—below normal. The most significant TC events in the southwest Pacific this season include Tropical Cyclone Yasa, which reached Category 5 (on the Saffir-Simpson Hurricane Scale) in mid-December and caused significant damage in Fiji, followed by Tropical Cyclone Niran which reached Category 5 in early March.

Sectoral Impacts – For March 2021–May 2021



Disaster relief supplies arriving in Palau in response to Typhoon Surigae. Photo credit: Red Cross.

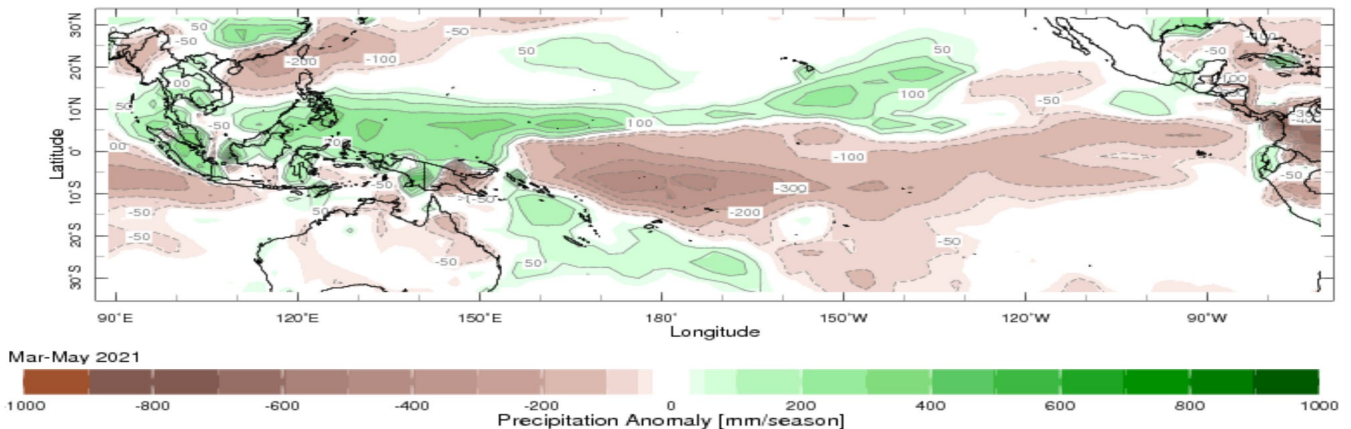


Hanalei Hill landslide on Kuhio Highway (Kauai) during the March 2021 heavy rainfall and flooding events. Photo credit: Hawaii Department of Transportation.

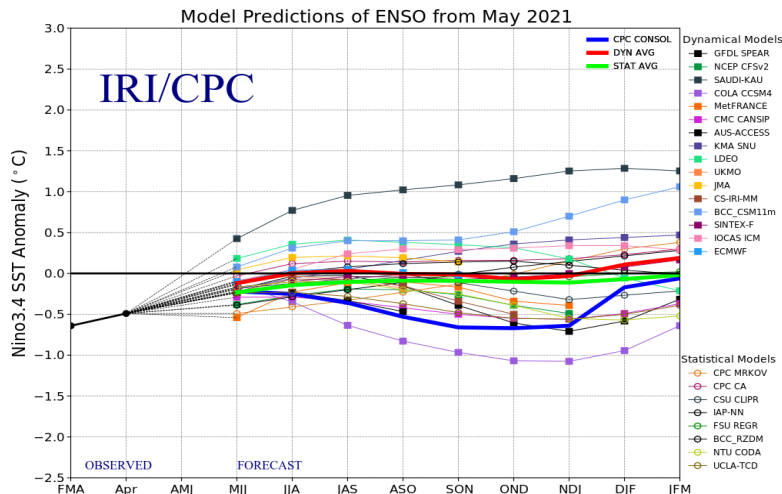
Agriculture – On March 9, U.S. Secretary of Agriculture Tom Vilsack approved a request from Hawaii Governor David Ige for a Secretarial Agricultural Disaster Designation for the on-going drought emergency in Maui County. The request was made in response to economic losses suffered by local ranchers and farmers due to the prolonged drought conditions which began in March 2019. In Kapingamarangi (FSM), crops and vegetation were recovering slowly from the long-term effects of the prolonged drought on the atoll.

Facilities and Infrastructure – In April, Typhoon Surigae brushed just north of the Republic of Palau (~40 miles), putting Kayangel State under a Typhoon Warning and the rest of Palau under a Typhoon Watch on April 16. Surigae brought heavy rains, high swells, landslides, and sustained high winds (reaching 84 mph) to Palau causing widespread damage to property, infrastructure, communications, and utilities. In the Hawaiian Islands, a slow-moving low-pressure system in mid-March brought torrential rains (72-hr totals up to 21 in.), landslides, and severe flash flooding to areas of Kauai, Maui, and Oahu—including overtopping Kaupakalua Dam, Maui. In American Samoa, king tides in April and May led to areas of minor coastal flooding on the island of Tutuila.

Water Resources – In Kapingamarangi (FSM), above-normal rainfall in April and May helped to replenish water catchment tanks. On Majuro (RMI), reservoir storage reached 96% of total capacity on May 31. In the RMI, water conservation measures were in place across the far northern Marshall Islands.



Seasonal precipitation anomalies for March 2021–May 2021. Areas with above-normal precipitation are depicted in **green** while areas with below-normal amounts are depicted in **brown**. Source: IRI; NOAA CPC CAMS-OPI.



May 2021 IRI/CPC Forecast

Source: <https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

According to the majority of ENSO prediction models (see IRI/CPC forecast above), **ENSO-neutral conditions are expected to continue through the Northern Hemisphere summer 2021 (78% chance) and fall 2021 (50% chance)** and are projected to dissipate with a near 50% chance of La Niña conditions re-developing during late fall and winter. However, there is considerable uncertainty associated with forecasts made during this time of year.

NOAA's Coral Reef Watch four-month (Jun – Sep 2021) coral bleaching heat stress outlook calls for **a high probability (60%) of high heat stress (Alert Level 1)** developing in areas around the Hawaiian Islands by late September.

According to NOAA's Central Pacific Hurricane Center and NOAA's Climate Prediction Center, there is an 80% chance of near- or below-normal tropical cyclone activity during the Central Pacific Hurricane season (Jun 1 – Nov 30) with 2 to 5 tropical cyclones predicted for the region.

During the period June 2021 through August 2021, **normal-to-above-normal** precipitation is forecasted for areas of FSM (Pohnpei, Kosrae) and RMI (Majuro). **Normal** rainfall amounts are forecasted for the Marianas, Palau, and Chuuk (FSM), and for Kwajalein (RMI). **Below-normal** rainfall is expected in American Samoa, Yap (FSM), and across the Hawaiian Islands, according to the NOAA Pacific ENSO Applications Climate (PEAC) Center.

For the next three months, dynamical models (NOAA CFSv2, ACCESS-S1 [Australia]) suggest **above-normal sea level anomalies will slowly diminish in the equatorial western Pacific, as well as away from the equator in the central Pacific in both hemispheres.**

NOAA Coral Reef Watch:
<https://coralreefwatch.noaa.gov/>

NOAA National Centers for Environmental Information:
<http://www.ncei.noaa.gov/>

NOAA NMFS Pacific Island Fisheries Science Center:
<https://www.fisheries.noaa.gov/region/pacific-islands#science>

NOAA NWS Weather Forecast Office Honolulu & Guam:
<https://www.weather.gov/hfo/>
<https://www.weather.gov/gum/>

NOAA OceanWatch - Central Pacific:
<https://oceanwatch.pifsc.noaa.gov/>

NPS Pacific Island Inventory & Monitoring Network:
<https://www.nps.gov/im/pacn/index.htm>

University of Guam - Water and Environmental Research Institute:
<https://weri.uog.edu/>

University of Hawaii Asia Pacific Data Research Center (APDRC):
<http://apdrc.soest.hawaii.edu/index.php>

University of Hawaii - Joint Institute of Marine and Atmospheric Research:
<https://www.soest.hawaii.edu/jimar/>

University of Hawaii Sea Level Center:
<https://uhslc.soest.hawaii.edu/>

USGS Science Center – Pacific Coastal and Marine Science Center:
<https://www.usgs.gov/centers/pcmssc>

USGS Pacific Islands Water Science Center:
<https://www.usgs.gov/centers/piwsc>

Western Regional Climate Center:
<https://wrcc.dri.edu/>